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Risk State**Nuclear Politics in an Age of Ignorance***Sulfikar Amir*

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Introduction

In his seminal work on risk society, Ulrich Beck writes, “In advanced modernity the social production of wealth is systematically accompanied by the social production of risk” (Beck 1992: 19). While Beck’s proposition accurately describes risk relations in advanced modernity, a compelling question arises: how should we characterize the social production of risk in less advanced modernity in which the majority of the world’s population lives? Does Beck’s statement imply that less advanced modernity faces less risk? To modify Beck, I argue that in less advanced modernity the social production of wealth is systematically surpassed by the social production of risk. To put this differently, as the result of structural factors, the introduction of complex technologies in the global south leads risk to grow faster than wealth in that part of the world.

Exploring technology and society in the non-western world, this chapter focuses on risk and modernity, a recurring theme in science and technology studies (STS) and sociological scholarship. As researchers have shown in myriad of case studies (for example, Jasanoff 1986, Wynne 1989, Kleinman et al. 2005), risk is deeply embedded in the foundation of modernity in which technology constitutes the preeminent causal agent of risk production and distribution. Most studies of the interplay between technology and risk, however, are situated in technologically advanced societies. There is a relative paucity of discussion of how technological risk looms especially large in less advanced modernity, countries marked by vulnerable institutions and weakly enforced regulations. This chapter is intended to fill this lacuna by giving an account of peculiar circumstance where less advanced modernity poses greater risk.

In advanced modernity, as noted by sociologists (for example, Douglas and Wildavsky 1983, Luhmann 1993, Giddens 1990), risk emanates primarily from the material constitution of a cornucopia of advanced technological products. The predicament is rooted in high degrees of uncertainty in which the inability to predict and to the control side effects of modern technological systems inevitably entails rampant production of risk (Power 2007, Callon et al. 2001). This is a paradox of scientific knowledge: it has severe limits while playing a key role in wealth generation (Wallerstein 2004, Bijker et al. 2009). As a result, the problem of risk is always regarded as a problem of knowledge, because it is in this domain where uncertainty lurks

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behind fascinating advancements of technology. Thus, modern societies are constantly faced with the challenge of overcoming uncertainties that characterize technological culture (Van Loon 2002).

In less advanced modernity, the picture is likely to be very different. Technology-related risk is an equally problematic issue, but greater risk emerges from another source. Although the uncertainty of technological knowledge remains a critical source of risk, the potential hazard from the utilization of high technology is prompted less by the limits of knowledge than by *precariousness*, *incompetence*, and *fragility* with regard to the institutional (in)capacity that plagues multiple layers of institutions in less advanced modern societies. To understand this requires taking modernity as a cultural system built not only on materiality that defines how one society achieves techno-economic progress, but more importantly on the arrangement of social and political institutions that govern everyday life. Hence, the underlying factor that renders a modernity advanced or less advanced rests on the institutional structure and culture that underpins social stability and order in contemporary society.

It is through this particular lens that this chapter aims to illuminate how technological risks tend to accrue in less advanced modernity as a result of institutional predicaments. Toward this end, I focus on a controversy surrounding the interaction between nuclear power and society in which the institutions of less advanced modern society appears to be the primary agent of risk production. Since the early twenty-first century, nuclear power has arisen as a potential alternative to fossil fuel; it has been touted as one of the best sources of climate friendly energy for humankind. Despite the Fukushima nuclear meltdown in 2011, the global obsession with nuclear power has not substantially diminished (Ramana 2013).

In less advanced societies of the developing world, the controversy over nuclear risk voiced by global anti-nuclear movements did not render nuclear power less attractive. Commitment to nuclear power production has remained firm, in particular among emerging economies that are obsessed with the superiority of nuclear power and desperately need to secure energy supply. Situating nuclear power in less advanced modernity thus requires an examination of the nexus between risk, technology, and institutions, for the three are inextricably interwoven in the formation of modernity.

My argument is that the state is the central institution that *escalates* risk production in less advanced societies. These countries are typically governed by what I term “risk states.” The structure and culture of risk states—or more specifically, the discrepancy between state capacity and the nature of risk embedded in high technology—create a situation in which these states are prone to augment the likelihood of hazards. To delineate how the interplay between the state and technological risk unfolds, the empirical setting of risk state in this chapter is situated in Indonesia, the fourth most populous country in the world. Like many developing states, Indonesia is strongly tempted to have nuclear power capacity in order to provide sufficient energy for industrial and economic growth. While the effort to produce nuclear power has been halted by strong resistance from the grassroots groups in the country, the Indonesian state remains unflinchingly adamant about introducing nuclear power to the nation. I elucidate the socio-political implications of such an ambitious venture, underlining what I call “institutionalized ignorance” as a puzzling trait of a risk state in coping with uncertainty and complexity of high technology.

A tale of an emerging economy

If one travels across the so-called global south, a cluster of less economically advanced countries, it is not too difficult to find a state obsessed with the perceived benefits of sophisticated

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technologies and inclined to turn a blind eye to the potential hazards. Indonesia is such a risk state, a country eagerly pursuing nuclear power production. A detailed analysis of the Indonesian risk state allows me to illuminate the main features of my argument.

Situated in the equatorial line between Asia and Australia, Indonesia is an archipelagic nation made up by more than 13,000 islands. Despite the fact that Indonesia is a predominantly Muslim country, and it is the largest Muslim population in the world, the social, cultural, and political dynamics of this country are largely shaped by multiculturalism and pluralistic ideologies, which are rooted in the history of politics in the archipelago long before the Europeans came to Southeast Asia (Ricklefs 2001).

During the formative years of the nation under the leadership of the first president, Sukarno (1945–1967), Indonesia underwent a turbulent period marked by strong ideological contestation between different political groups. A dramatic transition occurred in 1965 after a failed coup organized by what is known as the 30 September Movement; this historic moment was followed by massive annihilation of the communists.¹ The bloody event led to the rise of Suharto as the strongman of the New Order regime.

For the next three decades, the New Order ruled the country with an authoritarian system strongly supported by the military (Vatikiotis 1993). The striking feature of the New Order regime lies in developmental visions that sought to modernize the Indonesian economy and society by drawing on the western prescriptions of industrialization and high technology development. Relying heavily on oil revenues, the New Order government built the country's economic infrastructures and gradually improved the socio-economic wellbeing of Indonesian people (Hill 2000). Despite some criticism addressed to the New Order's culture of corruption and nepotism, Indonesia's economic achievements received praise and admiration from international observers in the middle of 1990s. Indonesia's rapid industrial transformation earned the country the label of "new Asian tiger" (Hill 1997).

But the Asian financial crisis severely struck Indonesia in 1997–1998, and turned the country upside down. Among the Southeast Asian countries affected by the financial crisis, Indonesia was the worst; the crisis spread from the financial and economic sectors to the political system, shaking up the stability of the New Order authoritarianism. In May 1998, President Suharto tendered his resignation, marking the abrupt collapse of the New Order government. A transition government was formed to bring Indonesia to a new political era, namely, liberal democracy.

Post-New Order Indonesia embarked on a different set of economic and political rules. Political reforms were implemented across a broad range of institutions from the central government in Jakarta all the way down to district administrations throughout the country. It was a massive overhaul that attempted to replace the New Order authoritarian structure with a new democratic system. The one-party system prevalent in the New Order was replaced by a multi-party system in which the central government is now composed of several political parties that bring different interests and agendas to the state politics. In contrast with the political system in the New Order era where the parliament was no more than a rubber stamp to Suharto's idiosyncratic decisions, the post-New Order era reflects the growing power of the parliament to monitor the executive branch in making and executing policy. Within this new institutional setting, all developmental programs and projects proposed by the executive branch of the government now must acquire approval from the legislative branch. The fundamental changes in the Indonesian political system are by no means without consequences. Some studies have shown that the new political system resulting from democratization and decentralization have had positive as well negative impacts on the ways in which public policies are conceived and executed (see, for example, Aspinall and Mietzner 2010). Corruption and

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inefficiency are among grave problems Indonesia is still suffering from, not to mention political contestations that affect the quality of government. The bottom line is that the Indonesian state continues to lack institutional capacities despite political reforms that had been undertaken at multiple levels.

Along with the political liberalization of the post-New Order political system, came economic liberalization. Suharto's administration was in fact friendly to market-oriented economics. The beginning of the Suharto rule was marked by the opening of Indonesian economy to foreign capital, deemed necessary to stimulate growth for domestic markets. Thus neoliberal policies were not new to Indonesia when they spread in the post-Suharto era. The New Order government was modeled, to some extent, after the developmental state in which economic management is not entirely organized around market mechanisms. The role of the state remained pivotal in ensuring the provision of basic public needs, such as education, health and food supply, and infrastructure (Thee 2012).

The prominence of the state in Indonesia's political economy gradually dissolved as a result of the Asian financial crisis at the turn of the twenty-first century. To cope with the plunging exchange values of the rupiah, the Suharto government accepted a conditional loan from the International Monetary Fund (IMF). This is the moment when a set of neoliberal policies were reluctantly implemented by the Suharto administration and its successor. For the next five years, the Indonesian economy was brutally liberalized following the Washington Consensus's prescription of "structural adjustments." Consequently, as the role of the state declined, the management of many public sectors was taken over by the markets, which accommodated the interests of the private corporations and multinationals. During this period, the majority of Indonesians lived in dire economic circumstances and the middle class shrunk dramatically (Hill and Shiraishi 2007).

Twelve years after the painful crisis that dramatically changed Indonesia, the country was back on track. Despite a few problems at local levels, many praised the flourishing of democracy in Indonesia (Ananta et al. 2005). Although poverty and unemployment remain relatively high, numerous economic observers have been amazed by how Indonesia has managed to improve the economy so successfully; it has changed from a country desperately relying on foreign aid into one of the largest emerging economies in the world (Geiger 2011). Between 2001 and 2012, Indonesia's GDP jumped from US\$160 billion to US\$850 billion and it is predicted to reach US\$1.1 trillion by 2013, making Indonesia eligible for the G20 membership.

Despite the 2008 global economic downturn that affected developed economies in Europe and North America, Indonesia was among a very few countries able to keep constant growth, thanks to the large proportion of domestic consumption that contributed to GDP. According to a well-known consulting company, Indonesia's growth trend is likely to continue, and by 2030 even surpass two major industrialized countries, Germany and the United Kingdom.²

Another indicator worth noting is the growing size of middle-class population. Rapid economic revitalization has allowed millions of Indonesians to enjoy economic benefits, particularly in the urban cities. This large group of citizens constitutes the new middle class whose consumption plays a major role in maintaining stable growth. One estimate shows that by 2030 there will be 170 million people in the consuming class, which is more than a half of Indonesia's projected population. This rosy prediction depicts Indonesia as an economic powerhouse that will play a strategic role for the global economy in a near future.³

Like other emerging economies, Indonesia is facing one common problem. The rise of middle class and the ongoing reindustrialization will continue only if sufficient supply of energy is provided to feed the myriad of economic activities in the manufacturing and financial sectors. For many years, energy production in Indonesia depended heavily on the country's

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oil resources. In fact, oil was the main source of revenue that the New Order exploited to finance national development. But this is no longer the dominant source of energy. Indonesia's oil reserves are rapidly depleting, and by 2005, Indonesia had become a net oil importer. The combination of a short supply of energy and the soaring energy demands to fuel an industrial- and consumption-based economy means that Indonesia faces the threat of an energy crisis. This poses an uneasy challenge to the state. It is in this looming crisis of energy that nuclear power enters the picture, along with a new politics of risk.

Nuclear in the state

While the early twenty-first century global trend toward nuclear power prompted Indonesia to embrace nuclear energy, it was the nuclear technocrats at the National Agency of Nuclear Power (BATAN) who picked up this momentum and mobilized it in the national energy policy discourse. To analyze nuclear politics in Indonesia thus requires understanding the history of its nuclear program since the 1950s, for this historical and institutional development forged Indonesia's strong penchant for adopting nuclear power at the beginning of the twenty-first century (Amir 2010a).

The aspiration to develop nuclear power capacity first appeared in the early years of post-independence, when President Sukarno felt worried about the radioactive fallout resulting from a series of thermonuclear tests conducted by the United States in the Pacific Ocean. Sukarno's concerns led to the formation of the Commission of Radioactivity Research in 1954. Although the commission was formed to assess the risks of nuclear fallout, commission members ended up developing an interest in acquiring nuclear power, as this technology was deemed strategic for Indonesia's economic development. In 1959 the Sukarno administration officially launched the Institute of Atomic Energy (LTA), the first governmental agency meant to build nuclear capacity in research and development.

In spite of Sukarno's inclination toward the eastern bloc, Indonesia managed to secure a US\$350,000 grant from the U.S. *Atoms for Peace Program* designed by the Eisenhower administration to supply basic information and equipment of nuclear technology to research institutions throughout the world while containing nuclear proliferation. This financial support was spent in the installation of Indonesia's first nuclear reactor in Bandung, a 250-kilowatt Triga Mark II, mainly used to produce isotopes and to facilitate neutron physics experiments. As the Institute of Atomic Energy (LTA) grew in importance in the middle of 1960s, it was renamed BATAN. At this point, Sukarno expressed interest in building an atomic bomb, and hoped to expand the capability of BATAN toward this end. This hope was short-lived, however, due to limited resources and the unstable political situation at that time. Sukarno lost power in the aftermath of the 1965 coup, and his ambition to turn Indonesia into a nuclear-weapon state vanished.

When Suharto came to power after the coup, Indonesia's nuclear program was reoriented toward civilian use. The New Order's friendly relations with the United States played a key role in focusing the nuclear program around non-military purposes. In 1970 Indonesia signed a non-proliferation treaty with International Atomic Energy Agency (IAEA) and fully ratified it in 1978. As result of the massive overhaul of the central bureaucracy by the New Order regime, BATAN was relocated under the Ministry of Research and Technology, headed by Suharto's closest aide, B.J. Habibie. During this time, the agency was given the task of regulating and promoting nuclear research and development. BATAN's regulatory function ended when the parliament passed the 1997 Nuclear Power Act, resulting in the creation of the National Nuclear Regulatory Committee (BAPETEN).

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Although no longer a ministerial-level agency, BATAN underwent a remarkable expansion during the New Order period. With a considerable amount of financial support from the New Order government, BATAN was able to develop capacities for conducting research and applying nuclear science and technology for non-military uses. To complement the first reactor in Bandung, another smaller research reactor was constructed in Yogyakarta in 1979. The Yogyakarta reactor had a capacity of 100-KW, and was primarily used to develop accelerator technology, for material processing, and for operator training. In 1987, Indonesia's nuclear program moved one step further when the G.W. Siwabessy research reactor began operation. This German-made 30-MW multi-purpose reactor is located in Serpong, on the outskirts of Jakarta, and is part of the Center for Science and Technology Development (PUSPIPTEK). The Siwabessy reactor was a highly visible materialization of the New Order's interest in nuclear science and technology, and remains the largest nuclear reactor in Southeast Asia to date.

BATAN is one of the largest governmental organizations in Indonesia. The agency employs highly educated and well-trained researchers and engineers, and it has grown rapidly since its founding. For the past thirty years, it has succeeded in applying nuclear science and technology to produce isotopes for a variety of non-military uses, from agriculture, medicine, to industry. However, the majority of BATAN high officials believed from the outset that the original mission of this agency was to develop nuclear power. The original plan for nuclear power development was initiated in 1972 when BATAN collaborated with the state-owned utility company, PLN, to form the Joint Preparatory Committee for Nuclear Power Construction under the auspice of the International Atomic Energy Agency (IAEA). For a few years, this committee carried out a series of studies to find a suitable location for nuclear power station in Java. In 1980, BATAN submitted a proposal to construct Indonesia's first nuclear power station. But Suharto turned down the proposal on the grounds that nuclear energy was not economically viable.

It was at the end of the 1980s when the New Order began to approve the possibility for adopting nuclear energy. With the help of Japanese Mitsubishi's subsidiary New Japan Engineering Consultant (NEWJEC), BATAN conducted a feasibility study to construct nuclear power station in the Muria peninsula of Central Java. In 1994, the study resulted in a proposal that suggested that the government construct twelve 600-MW reactors. But once again, the proposal had not been approved. When the Asian crisis came to cripple Indonesia's economy in 1997, the nuclear power agenda became more unlikely to be materialized.

The failure of nuclear power development in Indonesia under the New Order authoritarianism merits attention. One may be intrigued about why the construction of nuclear power plants was never materialized, given that the authoritarian politics of the Suharto regime provided favorable environments to realize a controversial technology without significant public resistance. Plenty of risky large-scale development projects, including dams, highways, and chemical plants, were effortlessly executed because there was little possibility of resistance to the New Order state. This development did not take place with regard to BATAN-proposed nuclear power plants. Instead, the New Order government deliberately delayed the project, not because of public protest, but more likely due to the political economy of oil that very much directed Indonesia's energy policy from the 1970s throughout early 1990s. During this period, Indonesia's abundant oil resources rendered nuclear power development less urgent than it was in South Korea and Japan for instance. Despite the failure to accomplish its original goal, BATAN achieved incredible progress in terms of the development of human resources and scientific research over the course of its thirty-year existence. Its contributions to industrial and medical sectors are also not trivial. It has established a reputation as a respected nuclear institution in the region. It is this set of institutional arrangements that has kept Indonesia's focus on nuclear power for years, outlasting the New Order regime itself.

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After being idle for a few years in the aftermath of the economic crisis, the Indonesian nuclear power program was revived in 2006. It was preceded by a decision of the Ministry of Energy and Mineral Resources (ESDM) to include nuclear power in the 2004 National Energy Policy. This was the first time nuclear power appeared in the formulation of energy policy, rather than as part of science and technology policy as it had been earlier. BATAN certainly played a significant role in advocating nuclear power as a strategic source for the energy supply system. The nuclear revival was in fact prompted by an in-depth study called the Comprehensive Assessment of Different Energy Sources for Electricity Generation in Indonesia (CADES), a scientific study on the different scenarios of energy input. Financially and technically supported by IAEA, the study was meant “to assess comprehensively the potential contributions of various energy options to the optimal long-term development of Indonesia’s energy supply and demand consistent with sustainable development” (cited in Amir 2010a). Although the CADES report assessed a variety of potential energy sources, nuclear power was disproportionally emphasized. The report concluded that Indonesia must harness nuclear energy as a means to sustain the national energy supply for two reasons: first, nuclear power was considered environmentally friendly, and second, the cost was seen as more competitive than conventional resources. The report’s strong recommendation for nuclear power clearly represented the technocratic logic that sought to direct the decision-making processes of the state. This proved to be effective: the Ministry of Energy and Mineral Resources (ESDM) adopted the recommendation of CADES in the updated national energy strategy, paving the path for nuclear power to become a significant source of energy in Indonesia. Two years later, President Yudhoyono signed the Presidential Decree No. 5, which laid out the grand plan for Indonesia’s energy mix by 2025. This composition of national energy supply included a total of 2% nuclear energy, a small—but sufficient—amount to get the nuclear program materialized once and for all (Amir 2010b).

What is strikingly different in the present nuclear power program, compared with what transpired in the past, is the interplay between democratic politics and nuclear politics. Despite deep concern by a small group in parliament and civil society groups, the Indonesian parliament was generally enthusiastic about the proposed construction of nuclear power station. Provided that the parliament serves as representative of the people, the parliament’s striking inclination toward approving the nuclear agenda gave nuclear technocrats a sense of legitimacy in pushing to bring nuclearization closer to reality. There are two reasons why most politicians in the parliament were firmly convinced that nuclear power was indispensable. First, the sense of an energy crisis was widely shared among politicians, which also tended to hold an optimistic view of the potential of nuclear energy to help address the emerging crisis. Second, possessing nuclear capacity was regarded as politically strategic for Indonesia. Many members of the parliament regarded nuclear power as source of respect and esteem from neighboring countries. The bottom line here is that nuclear power in Indonesia is driven by a need for energy security and status, not necessarily in terms of military interest. As other writers have noted, the ability to be seen as technologically self-sufficient and independent is a common feature in nuclear politics of the state (Massey 1988, Jasper 1990). The question is how this nuclear politics intersects with public concern over its risks, in a new democratic environment.

The specter of risk

Risk is one of the most noticeable factors in technology-society relations. It is defined, in strictly technocratic terms, as the probability that hazards and dangers will occur. As noted earlier, risk is a prominent discourse in modern cultures that are characterized by deep

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penetration of scientific technology in everyday life. In sociological studies of risk, risk emanates from a wide spectrum of sources in social, cultural, and political spheres, and has two critical aspects. First, risk is always perceived, and it is the perception of risk that informs collective actions and responses toward technological objects (Douglas and Wildavsky 1983, Slovic 2000). Second, in many modern societies, concerns are often expressed about the production and distribution of risk and vulnerability (Beck 1992, Perrow 1999). This dimension of risk calls for an investigation that seeks to unpack how complex technological systems spread risks across societies in ways that increase our vulnerability to accidents and disasters. The bottom line is that the locus of risk and technology lies in *uncertainty*, a condition that characterizes virtually every form of modern technology due to the complexity of the world and the limits of knowledge.

Perhaps there is no more controversial technology than nuclear power. Ever since nuclear power was fashioned out of the same technology that produced the atomic bomb, it has faced social and political challenges (Welsh 2000, Sovacool and Valentine 2012). The root cause is the risk, which can turn into long-term social and environmental damages if it is inadequately controlled. So tremendous is the risk embedded in nuclear energy systems that it requires a centralized structure of control, which renders this particular technology highly political and authoritarian in nature (Winner 1986). The sixty-year history of nuclear power, as such, is replete with tensions, conflicts, lack of transparency, and minor and major accidents, culminating in nuclear disasters in three different social and political contexts, namely, Three Mile Island, Chernobyl, and Fukushima. Gabrielle Hecht's (2012) seminal work on nuclear materials reveals the accumulated troubles plaguing nuclear power production that vividly exhibit the vulnerability of this particular technology (see also Hecht's work on nuclear workers, Chapter 20 in this book). This damaged image notwithstanding, nuclear power has continued to grow in popularity and continues to be seen as viable energy option for any state.

The expansion of nuclearity that we are seeing in many parts of the world today has been challenged at multiple levels by civil society organizations that deem this technology to be one of the greatest dangers to democracy and civil society (Flam 1994). In an emerging democracy like Indonesia, public opinion matters a great deal and has significant impacts on how policies are made, chosen, and deliberated. The nuclear power program is not an exception. Thus, despite the growing currency of nuclear power in post-New Order Indonesia, the technocratic power that created and promoted the nuclear power program has faced a considerable challenge from civil society groups, which have held very different views about how nuclear power might possibly harm people. Given the contention over nuclear power in other democracies, it comes as no surprise that the Indonesian nuclear revival in 2006 triggered massive public opposition strongly organized by environmental groups and manifested in mass organizations. An open political atmosphere, along with the free flow of information, allowed anti-nuclear activists to mobilize support from various sectors of civil society, who questioned the government's seemingly malicious plan to bring nuclear power into the disaster-prone country.

These public expressions are a direct result of the democratization Indonesia has undergone since the 1998 *reformasi*, the dramatic political change that opened up new possibilities for civic engagement in public affairs. A set of political transformations as part of the democratic transition provided a venue for concerned citizens to openly question the logic, assumption, and vision that guided Jakarta's strong support of nuclear power. The way different citizen groups managed to work together to scrutinize techno-economic calculations justifying the production of nuclear energy was remarkable. A body of scientific information on the consequences of nuclear power collectively gathered by civil society groups formed what Sheila Jasanoff (2005) terms "civic epistemology" whereby social, cultural, and environmental risk of the

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presence of nuclear power station in Java was broadly assessed. This public assessment of nuclear risk informed the efforts of the anti-nuclear movement to convince the general public that nuclear energy is not an option for the country. This shared concern over nuclear risk resulted in a strong alliance of anti-nuclear groups that include environmental NGOs, students, intellectuals, anti-nuclear scientists and engineers, and even religious groups (Amir 2009). This opposition has formed an extended network of movement groups that spans from Jakarta all way down to Jepara, Central Java, the proposed site for Indonesia's first nuclear power station.

The massive opposition to the nuclear power program caused a few years of delay in the construction of the first nuclear power plant. This might be regarded as a victory for the anti-nuclear movement in Indonesia, since it was able to put on hold the attempt of BATAN to realize its old ambition. The question of how the proposed nuclear power plants will be kept safe remains the predominant element of the controversy. But there is something peculiar about the discourse of nuclear risk in Indonesia as voiced by anti-nuclear groups. Every group may have different emphasis on which risk factor that concerns them. However, there is one poignant factor that appears to raise more apprehension to all anti-nuclear groups as well as the public in general: the likelihood of nuclear accident and disaster because of the lack of institutional capacity and competence of the state for handling high-risk technology.

The problem of state capacity has loomed large since the collapse of the New Order authoritarianism. The demise of Suharto's power had a significant impact on the way the state carried out its duties, a common shift found in post-authoritarian regimes. The development of a multi-party system and decentralized politics were part and parcel of what caused the weakening of the state capacity to ensure public safety and security. This lethargic condition was clearly indicated in a series of events in which the state miserably failed to quickly respond to an array of recurring crisis situations such as terrorism, natural disasters, and infrastructure accidents. In recent years the Indonesian public transport authority has had a notoriously high record of deadly accidents such as airplane crashes, train derailments, and ferry sinkings. Even worse is the terrible failure to mitigate the Sidoarjo mudflow disaster in eastern Java, which displaced thousands of Sidoarjo residents and wasted millions of dollars on impotent measures aimed at ending the flow of hot mud.

The inability of the state to properly manage this large scope of public safety and security problems prompted many Indonesians to believe that the state was utterly unable to oversee, let alone operate, nuclear power plants, which comes with built-in systemic risk.⁴ The bottom line is that the Indonesian state has weak institutional capacity due to inefficiency, lack of transparency and coordination, and widespread corruption plaguing virtually every layer of the state bureaucracy.

Although nuclear technocrats refer to thirty years of experience in operating nuclear research reactors in BATAN facilities as a proof of competence, the anti-nuclear groups argue that safe utilization of nuclear power necessarily requires institutional capacity and competence more than just the ability to operate research reactors. In other words, the credentials of BATAN in research and development is not considered reassuring because the scope of nuclear power production is far beyond research-oriented activities, where the agency is seen as competent (see Amir 2009).

As Mary Douglas (1985) has pointed out, risk is always perceived whether it is defined by lay people or by technical experts, and perception is a cognitive impulse largely influenced by social and cultural circumstances. Hence, the prolonged weak condition of the state in Indonesia strongly affected the way the public looked at nuclear risk as a fundamentally institutional problem. The lived experience of individual citizens in going through a long list of public safety troubles and disaster due to the ineptitude of the state to perform its duties across

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public sectors led to a widely shared perception that the state was producing life-threatening risk in the proposed nuclear power development. A big contradiction appears in this picture: while the state supported an aggressive campaign to promote nuclear power as a safe system of electricity generation, at the same time it repeatedly showed massive failures in protecting citizens from dangers and hazards.

The gist of the risk problem lies in declining trust of the public to the state. In this light, what concerns the public was less the technical risks of nuclear power than the institutional risk caused by the visible incompetence of the state even in performing its mundane duties. This means that threat to public safety does not emerge from the technology itself but from the state. In other words, the risk is embodied in the institutional precariousness of the state.

Institutionalized ignorance

In the aftermath of Fukushima nuclear disaster, many believe that nuclear energy will abruptly decline and soon be replaced by other options for renewable energy. This is the case in several countries, where the government is determined to bring nuclear power into a gradual phase-out. However, a great number of other countries instead express confidence in nuclear energy. In the post-Fukushima world, this may seem awkward. As noted above, this is what has unfolded in Indonesia, one of those countries where government officials are eager to embark on the nuclear power program despite what transpired at Fukushima.

The organized resistance drawn by the anti-nuclear groups may have delayed the introduction of nuclear energy but it did not terminate the entire program. On contrary, the nuclear power program remained in progress, though at a slower pace. Strong protest and criticism from the anti-nuclear movements entailed only changes in the scheduling and siting of the reactors that BATAN had proposed to the government. Since the Muria Peninsula of Central Java was no longer politically suitable to host the construction of Indonesia's first nuclear power plant due to formidable refusal in the area, BATAN decided to relocate the site to another location. Indonesia's vast geography and the low level of opposition in some areas gave nuclear technocrats many options for siting nuclear power plants.

Bangka Island, a province outside of Java, was eventually designated as the new location. In the new site, BATAN effortlessly acquired approval from the provincial government, which was enthusiastic about nuclear power. Lack of electricity led the Bangka Island government along with its citizens to believe that the construction of nuclear power plants would benefit the area.⁵ This enthusiasm was bolstered by financial support from the National Development Planning Agency (BAPPENAS). This money was specifically allocated for preparation measures, including so-called "socialization" aiming to increase a positive image of nuclear energy in the public.⁶

The eagerness of a country like Indonesia to go nuclear can be explained from an amalgamation of three major factors—political, symbolic, and economic. The first factor is the Indonesian "technopolitical regime" (Hecht 1999) consisting of technological practices, networks of individual researchers and technocrats, and pro-nuclear politicians in political party. The nuclear technopolitical regime in Indonesia is concentrated in BATAN, but is tightly connected to universities and domestic and foreign/international research institutions and agencies. Reinforced by a socio-technical imaginary (Jasanoff and Kim 2009) upon which nuclear politics bases its *raison d'état*, the technopolitical regime was able to survive political changes and managed to carry its vision on over generations. The longevity and staying power of BATAN has meant that despite strong disapproval of many groups of civil society, the impetus for going nuclear has remained firm.

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Hand-in-hand with the role of the technopolitical regime in pushing nuclear power forward in Indonesia are symbolic factors. In a post-colonial state, modern high technology embodies not only material and physical properties but also symbolic meanings which the state seeks to produce as a quintessential part of national identity. The magnificence of technological artifact such as the nuclear reactor engenders what Itty Abraham (1998) aptly describes as a fetish in which the material and physical superiority of high technology is deeply embraced by the state, animating the post-colonial imagination. This is acutely exhibited in the discourse of nuclear power circulated among state bureaucrats, technocrats, and pro-nuclear politicians. In this discourse, the construction of nuclear power is regarded as a testimony to the state's capability for conquering superpower technology.

Inextricably intertwined with the political and symbolic forces is the economic rationale. The proven ability of nuclear power to provide large-scale production of electricity, as shown for years in several countries most notably France, Japan, and South Korea, simply justifies the value of the technology to boost economic growth. The bottom line is the interest in growth. For a country that is undergoing an unprecedented economic boom, growth serves as the ultimate goal that informs the Indonesian government in making decisions. As an emerging economy, growth is almost everything to Indonesia because it is the yardstick that defines the wellbeing of the country. After years of economic malaise in the aftermath of the Asian crisis, the return of growth is certainly seen as a kind of historic momentum not to waste; it is regarded as an imperative of socio-economic progress that must be maintained, if not increased. It is the profound interest in growth that becomes the underlying logic pushing the venture to go nuclear, for a steady supply of energy is the backbone in every effort to keep the economy from stalling. In a modern economy, sustainable production of energy allows industries and economic activities in all sectors to run and to stay productive, as well as to power homes, hospitals, schools, and public facilities. The bitter experience of economic crisis taught Indonesia an important lesson, which is that growth is what matters in maintaining the legitimacy of the state and that growth depends on high and stable levels of energy production. The close association of nuclear power with growth entails a conviction that nuclear power is inevitably needed in order for the state to be able to keep the economy afloat for a long run.

A combination of the aforementioned factors creates a penchant to overlook the fact that nuclear risk is likely to increase because of the lack of institutional capacity in the state. It is a situation whereby interests outweigh concerns, and the perceived necessity prevails over potential consequences. Furthermore, ignorance becomes the norm of governance that clouds good and clear judgment. The pursuit of one specific goal dismisses all other scenarios that may give the same desired outcome at the end. This is not to say that the technocratic logic that drives the nuclearization process did not acknowledge risk potentials at all. Risk analysis is indeed part of BATAN's preparation measures to ensure that Indonesia's venture into nuclear energy would be safe and secure. The problem is that risk in the large-scale undertaking is defined mostly as a set of technical issues that simply demand technical solutions. This has resulted in a set of recommendations in which safety, security, and safeguards become the jargon, and the approach emphasizes a narrow range of factors.

The ignorance lies in the technocratic epistemology that prompted this mode of risk analysis. In this context, the broader spectrum of social and institutional risks remains largely *ignored*. As technocratic analysis of risk is strongly focused on potential hazards that come from technical problems, it fails to acknowledge weak institutional capacity of the state, which is the reason for public outcry and is directly relevant to nuclear risk. If critically scrutinized, there seems to be a discrepancy between what nuclear technocrats consider risk and the structure of the institutions under which the nuclear energy project was implemented. Nuclear technocrats were

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oblivious to the myriad of institutional problems—such as corruption, lack of coordination, and bureaucratic inefficiency—which could gravely affect the operation of nuclear power. BATAN officials appeared to ignore the fact that the successful operation of any technological system is underpinned by a network of transparent, well-integrated and well-governed organizations and infrastructures.

In this light, the ignorance of institutional risk plaguing Indonesia's nuclear power program was a result of the failure of technocratic thinking in which the adamant desire for nuclear power eclipsed the ability to comprehend the complex nature and high-level uncertainty of nuclear risk. The spread of blind enthusiasm among decision-makers in the parliament as well as the central government as illustrated above added to ignorance of the risk. These individuals were supposed to examine each and every consideration when making a decision that would affect society at large, but have failed to do so.

The propensity to downplay the social and institutional risk of nuclear power production produced what I refer to as *institutionalized ignorance*. Ignorance is institutionalized when an array of legal instruments such as laws, decrees, and regulations are conceived following narrow-minded assessments of risk that aim to legitimize the undertaking of large-scaled technological projects with a high degree of risk. It signifies a paradox in contemporary culture in which the growth of knowledge expands the realm of ignorance (Gross 2010). *Ignorance implies intentional actions to eschew the responsibility for having a comprehensive view of risk in assessing highly uncertain technological adventures*. The use of technical jargon blended with ostensibly nationalist interests cement the institutionalization of the ignorance of risk.

The persistence of Indonesia's nuclear program is precisely rooted in institutionalized ignorance, for it exploits institutional authority in pushing forward the construction of nuclear plants amid social protests against the suitability of the high-risk technological enterprise. There are several legal products that empirically exemplify institutionalized ignorance in the nuclear power program. The strongest is “the 2007 Law of Long-Term Planning of National Development, 2005–2025.” The Indonesian parliament passed the law as a response to the need to have a macro long-term development planning, a technocratic measure inherited from the New Order's developmental technocracy. What nuclear advocates found profoundly gratifying is that the law explicitly states that Indonesia should begin operating nuclear power plants between 2015 and 2019 as part of the national energy system. The law is the first of its kind to specifically oblige the central government to implement the nuclearization agenda. However, there is no mention in the law of how nuclear risk should be governed. It provides “constitutional” legitimacy to turn BATAN's proposal into reality; consequently, it also renders critics and actions against nuclear power “unconstitutional.” With this law, nuclear technocrats could argue that the government could be the subject of impeachment if it failed to accomplish this long-term goal.⁷

The prevalence of institutionalized ignorance has considerable implications for democracy. As noted before, democratization had allowed Indonesian people to express their opinion and concern over the state's technocratic efforts to introduce high-risk technology in society. However, limitations mark how democracy works. It does not always produce benevolent decisions, for democracy is part of politics and power struggle. In a young democracy like Indonesia, decision-making remains heavily influenced by powerful groups in which technocratic thinking often times serves to justify political economic interests of the state and its allies. This is illustrated in the nuclear power program in which the law that legitimized nuclear power was a product of the democratic system but contradictory to public concerns. Rather than create an open atmosphere that allows comprehensive public examination of high-risk technology, the Indonesian democracy provides a venue for institutionalizing ignorance with

far-reaching consequences. Democracy seems to have failed to govern risk as a political problem. Certainly this is not the end of the story. What remains to be seen is whether the ongoing democratic transition in Indonesia could turn back the political pendulum and switch ignorance into awareness.

Conclusion

As STS scholars have noted, the outcomes of technology-society interaction vary across societies. A multitude of technical, social, and political factors play key roles in determining how society responds to the introduction of new technology and how modern technology is able to keep its grand promise (Bijker et al. 1987, Bijker and Law 1992, MacKenzie and Wajcman 1999). This chapter situates the technology-society relation in the discourse of risk, focusing specifically on the role of nuclear power in emerging economy and democracy, Indonesia.

In a time when emerging economies are increasingly preoccupied with technological accomplishment, the pursuit of high technology seems appealing to the state because it promises to bring improved well-being and higher prestige. This is the main reason why states in the global south are strongly eager to undertake efforts to create large-scale technological projects in which the vocabulary of risk seems to disappear from the developmental nomenclature.

Nuclear power is not the only technology that bears great risk. However, the risk of nuclear power is believed by some to exceed that of other large scale technologies because it has a broad spectrum of impacts across spatial, biological, and temporal dimensions. Hence, nuclear risk is a matter of scale, spread, and temporality of destruction. This causes nuclear power to remain highly controversial in contemporary societies despite its contribution to substantial socio-economic progress in some countries, such as Japan, South Korea, and France.

As pointed out in this chapter, there are multiple dimensions of risk in nuclear power development. Each of these dimensions plays out differently in different socio-political contexts. Indonesia's nuclear power program highlights one particular dimension of risk: institutional risk. Beyond the technical hazards of nuclear power, the development of nuclear power in Indonesia occurs in an environment of a state with limited capacities. This has been among the concerns of the critics of nuclear development in Indonesia.

The confrontation between nuclear technocrats and civil society groups in the nuclear power controversy underlines one sociological aspect that characterizes technology-society relations, namely, trust. A state with fragile capacities does not engender trust among citizens. This constitutes a fundamental problem in less advanced modernity and certainly in Indonesia. Moreover, in an environment of institutional risk and ignorance, where the state is not adequately equipped with organizational competence and genuine commitment to the well-being of society, the social production of risk may exceed social production of wealth.

One last note: the logic of the state, albeit democratic, is not necessarily congruent with people's concerns. For the state possesses its own interests, which govern how it makes decisions and take actions. The failure of democracy to control this logic results in ignorance of the state, channeled through institutional regulations. The institutionalization of ignorance can have far-reaching implications because it obstructs the possibility for social control of high-risk technology. In the end, the state becomes the embodiment of social production of risk.

Notes

- 1 There is an ample collection of works investigating this tragic event. The most noted, yet controversial, account is the so-called "Cornel Paper" written by Anderson and McVey (1971). For a more recent study, see Roosa (2006).

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- 2 See Oberman et al. (2012).
- 3 Ibid.
- 4 The empirical material of this observation can be found in Amir (2010a).
- 5 See "Nuclear Power Plants to be Built in Bangka Belitung, Governor Says." *The Jakarta Post*. July 06 2011.
- 6 A budget of approximately \$50 million was allocated by BAPPENAS to facilitate the preparation of basic infrastructure documents such as siting studies, environmental impact analysis, etc.
- 7 A statement from former minister of research and technology exemplifies this argument.

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